

## Impact of Intellectual Capital on Return on Asset in Nigerian Manufacturing Companies

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### ABSTRACT

*In the knowledge-based era and intellectual capital (IC) regime, literatures abound on the impact of intellectual capital component and company performance especially in the developed countries. However, only a few scholars have written on this topic in developing countries in general and Nigeria in particular. In view of this, this study examines the impact of intellectual capital components on return on asset (ROA) in Nigerian Manufacturing companies. To this end, annual reports of sample companies were analysed using Value Added Intellectual Coefficient (VAIC<sup>TM</sup>) as proposed by Pulic (2000). Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE) are used as intellectual capital components efficiencies, while ROA (productivity) was used as a measure of company's performance. The study further examines the impact of value added efficiency of IC on company performance with multiple regression techniques using SPSS 16 software package. The results show that, relationship exists between intellectual capital components efficiencies and company performance. Furthermore, human capital influences productivity (ROA) performance of the sample companies' more than structural and physical capital. Therefore, it is recommended that sampled companies should embark on policy that will improve their employees' skill such as training and development and good welfare package which ultimately will improve the overall performance of the companies.*

**Keywords:** Human Capital, Structural Capital, Value Added Intellectual Coefficient (VAIC<sup>TM</sup>)  
Manufacturing Sector, Nigeria

### INTRODUCTION

Traditional way of measuring and valuing company performance is mainly based on physical assets (Ahangar, 2011) using conventional double entry accounting system. Company Performance Measurement System developed based on economies theory mainly on factor of production which are land, labour and physical capital where unique contribution of management in 20<sup>th</sup> century results in half fold increase in productivity of manual employee by converting labour intensive economy into mechanical economy (Drucker, 1993). Now, the world economies are undergoing transformation and changing from manual to knowledge intensive activities (Makki and Lodhi, 2009; Makki, Lodhi and Rohra, 2009) which is basically intellectual capital.

This knowledge-based economy compelled many companies and countries to plan strategies for repositioning in the emerging knowledge economy with remaining competitive (Roos et al., 2005; Bornemann, 1999; Fethi et al., 2011). Now that the rules of business are being rewritten and that the traditional era enterprise models are no longer adequate to meet the dynamic condition of a changing world market and the information needed by investors to make strategic decision (Okwy and Christopher, 2010; Abeysekera, 2007; Garcia-Ayuso, 2003), there is a need to examine the impact of IC resources on company performance (Tayib and Salman, 2011). The widespread acceptance of IC as a source of competitive advantage led to the new ways of monitoring operations needed to achieve maximum productivity from intellectual resources in the new century of knowledge (Madininos et al, 2011; Salman and Tayib, 2012, and Makki and Lodhi, 2009) as most companies depend on intellectual capital. Service providers companies (banks, hotels, information and communication), technological companies, biochemical and pharmaceutical companies depend to a considerable extent on intellectual capital resources for sustainability and to earn their revenue (Ahangar, 2011). In knowledge economy, intellectual is considered crucial for sustainability and competitiveness of companies regardless of the industrial affiliation (Makki, Lodhi and Rohra, 2009). Even the manufacturing and production companies use intellectual capital together with their physical capital to enhance their competitive edge within and outside their industries (Chen et al, 2004; Ahangar, 2011). Pulic, (2000) and Bornemann, (1999) propose correlation between intellectual capital potential and financial performance.

The biggest challenge faced by companies in knowledge economy era is to get best out of its intellectual resources and view corporate knowledge as the only sustainable source of competitive advantage in business (Makki, Lodhi and Rohra, 2009). This shift from traditional measure of company's performance to knowledge-based economy requires companies to maximize value creation from its intellectual capital to succeed in WTO regime (Roos et al., 2005). This competitive edge is gained through enhancing value creation efficiency from IC components (human creativity, experiences, ability, skill, operational structure, customer and supplier relation channels (Ahangar, 2011, Salman, Yahaya and Olarewaju, 2011).

### **SIGNIFICANCE OF INTELLECTUAL CAPITAL AT CORPORATE LEVEL**

Edvinsson and Malone (1997) define IC as the knowledge that can be converted into value.

Many companies around the globe adopted intellectual capital managing strategies earlier and were very successful in improving their productivity and efficiency (Makki and Lodhi, 2009). Skandia Insurance Company, the developer of Skandia Navigator had achieved 75% saving in administrative expenses while at the same time enhanced productivity by 400% over a period of six years (Morgan, 1998). Abernathy et al. (2003) estimate that investment in intellectual capital yields twice returns as compared to the same amount of investment in physical assets. The top ranked 10 Asian companies between the periods of 1995 to 2001 were those companies that create value to their shareholders through intellectual capital (Salamudin et al. 2010). Specifically, these companies investments are focused on human capital and network effect rather than physical capital (Tseng and Goo, 2005; Makki et al., 2009). Mostly, electronics companies, service companies, technological companies and biochemical do engage more of intellectual capital resources than other companies. For example, Toshiba electronic company achieved 20% higher productivity after adopting intellectual capital management (ICM) strategy in its factory (Fruin, 1997). On the other hand, there are many companies which fold-up due to their inability to manage and nurture their intellectual resources (Antal et al, 1994).

### **IMPORTANCE OF INTELLECTUAL CAPITAL MANAGEMENT IN NIGERIA**

Intellectual capital (IC) has been regarded as the back bone for business success (Pulic, 2004). The significant role of IC for company in achieving its sustainability and competitiveness has also been emphasized in World Development Report (1998) "today's most technologically economies are truly knowledge based". Drucker (1993) and Bornemann et al, (1999) argue that knowledge which supersedes land, labour and capital is the only meaningful resources for business operation (factor of production). In addition, the Nigerian Accounting Standard Board (NASB) admits that Nigeria being an emerging country needs intellectual capital to resuscitate the present status of the companies in the sectors (Olaofe, 2006). Following the above statement one can deduce that both the economic managers and government authority of many countries like Nigeria feel that it is inevitable to transform the production-based economy to knowledge-based economy to achieve industrialization strategy in order to improve the pace of economy development.

### **RESEARCH OBJECTIVES**

The study is based on the argument that IC efficiency influences return on asset (ROA) through its value creation. The main aim of this study is to investigate how IC components (HCE, SCE and CEE) efficiencies influence manufacturing companies' ROA in Nigeria over three years period.

### **REVIEW OF RELEVANT LITERATURE**

Intellectual capital has been recognized as an important resource for a company to enhance its competitive advantage and at the same time to improve its corporate image in the global market, still there has been a controversial issue of intellectual (intangible) assets reporting on whether it is value relevant to be considered as asset, even though its association with company's expected future benefits is not certain. Recent studies on value relevance of intellectual capital assets include Salman et al. (2012); Maditinos et al, (2011); Chang and Hseih (2011); Ahangar, (2011); Salman et al, (2011); Salamudin et al, (2010); Okwy and Christopher, (2010); Appahumi, (2007); Yalam and Coskun, (2007) and Ting and Lean, (2008). These researchers have found intellectual capital to be value relevant in both companies' financial performance and market capitalization using VAIC model.

Specifically, Maditinos et al, (2011) examined IC and financial performance of public listed companies in Greece. The study reveals that IC components are significantly correlated with companies' financial performance. Appahumi (2007) investigated the influence of IC components efficiency on capital gain of financial companies (banking, finance and insurance) in Thailand. The findings provide that there is a significant positive relationship between the two variables. Yalam and Coskun (2007) conducted empirical study on IC performance of banking sector of Istanbul stock exchange; the findings provide that there is a strong correlation of IC value added efficiency with profitability. In the same vein, Chang and Hseih (2011)

evidenced that IC is associated and has impact on both financial and market performance of Taiwan companies. Ting and Lean (2008) examined IC value added efficiency on financial performance of Malaysia companies and found that IC value efficiency is associated with profitability of sampled companies. Tan et al (2007), using VAIC model on 150 listed companies in Singapore, concluded that IC and companies' performance have positive relationship. Salman et al. (2012) investigated 20 listed service companies IC and corporate performance in Nigeria using VAIC method. The result of their findings show there is significant positive correlation among IC components, ROA and market value. In addition to studies conducted using VAIC model is the work of Tseng and Goo (2005), which used structural equation modelling to test the influence of IC on company performance. Tseng and Goo (2005) examined the relationship between IC components and corporate value of Taiwanese manufacturing companies. The result revealed that there is positive relationship between IC and corporate value. On the other hand, the work of Firer and Williams (2003) found no relationship between IC components efficiency and financial performance of South Africa companies. Likewise the study of Kujansiva and Lonnqvist (2007) do not find clear evidence of the relationship between IC and company performance of Finland companies.

Impact of IC components efficiency on corporate performance is being studies over two decades but still no consensus has been reached on its role on corporate performance due to mixed and inconsistencies results in studies conducted in different countries. These mixed and inconclusive results gear this study and more other researchers to conduct research on the influence of IC on corporate performance across time nations in different domestic setting to conclude the relationship.

## METHODOLOGY

Manufacturing companies play an important and crucial role in the present Nigerian economy. Hence, in this study, data were gathered from a sample of 20 Nigerian listed manufacturing companies' annual reports for three years periods (2009- 2011). The study makes use of systematic random sampling of all manufacturing companies listed in the Nigerian Stock Exchange Ilorin archive at the time of compiling the data.

Data was collected from 2009 to 2011 fiscal year financial statements of 20 listed Nigerian manufacturing companies. The sample size was limited to one sector so as to obtain a homogeneous sample. The research work makes use of Value Added Intellectual Coefficient (VAIC) method to calculate the Value added by each component of intellectual capital of the sampled companies in order to determine how efficient these companies are in the use of their intellectual capital resources.

### *The VAIC Method*

Value Added Intellectual Coefficient (VAIC<sup>TM</sup>) was first introduced by Pulic (2000) as a method of assessing the efficiency of intellectual (Intangible) asset. It gives a new insight to measurement of value creation and monitors the value creation efficiency in companies' production resource via tangible and intangible assets (Shiu, 2006). VAIC is developed to assess and evaluate the 'efficiency' in adding value (VA) to a company's total resources while each major resource component focuses on value addition in an organization and not on cost control (Shiu, 2006; Pulic 2000; Boremann, 1999). The VAIC approach is based on five steps. Firstly, to find out the competence of a company in 'creating' or value added (VA), the difference between output and input should first be calculated.

$$OUT - IN = VA$$

Where OUT (output) included the overall income from all products and services sold on market, IN (input) contains all expenses for operating the company, exclusive of labour expenses, which is not regarded as a cost. VA (value added) results from how current business and related resources (capital employed, human and structural) are used or employed. The next is to determine how much new value has been created by one unit of investment capital employed, while the second step is the calculation of the value added employed (including physical and financial).

$$VA/CA = VACA$$

Where VACA is the Value Added Capital Coefficient.

The third step is to assess the relation between value added and human capital employed in order to show how much value has been created and added by one financial unit invested in employees.

$$VA/HC = VAHC$$

Where, VAHC is the Value Added Human Coefficient.

Pulic (1998) submits that structural Capital (SC) is calculated when human capital (HC) is deducted from value added; with HC and SC being in reverse order.

The fourth step is to find the association between VA and SC, indicating the share of SC in creating value.

$$SC/VA = STVA$$

Where STVA is the value Added Structural Capital Coefficient

The fifth step is to assess each resource that helps to create VA.

$$VAIC^{TM} = VACA + VAHC + STVA$$

Where= VAIC, the Value Added Intellectual Coefficient, indicates corporate value creation efficiency. Prior researches from Shiu (2006) and Firer and William (2003) define VAIC as a composite sum of three separate indicators. These indicators are Human capital efficiency (HCE): indicator of the VA efficiency of human capital; Structural capital efficiency (SCE): indicator of the VA efficiency of structural capital; and Capital employed efficiency (CEE): indicator of the VA efficiency of capital employed.  $VAIC = HCE + SCE + CEE$

As earlier mentioned, the study uses the VAIC method as modified by Shiu (2006) and Firer and William (2003) and the measure of independent variables as:

$$VAIC_i = HCE_i + SCE_i + CEE_i$$

Where  $VAIC_i + VA_i$  intellectual coefficient for company i;

$HCE_i = VA_i/HCi$ ; human capital coefficient for company i;

$SCE_i = SC_i/VA_i$ ; structural capital VA for company i and

$CEE_i = VA_i/CE_i$ ; VA capital employed coefficient for company i

$VA_i = li$  (sum of interest expenses) +  $D_{pi}$  (depreciation expenses) +  $D_i$  (dividends) +  $T_i$  (corporate taxes) +  $P_i$  (profits retained for the year)

$HC_i$  = total investment salaries and wages for company i;

$SC_i = VA_i - HC_i$ ; structural capital for company i; and

$CE_i$  = book value of the net assets for company i

In this research work, the following indicators stand for dependent variable. They are ROA was used as proxy measures respectively for productivity (Nazari (2010); Shiu, (2006); Firer and William (2003)).

ROA; ratio of the net income divided by book value of total assets;

Size and leverage were used in this study as control variables as suggested by prior studies ((Zegral and Maaloul, (2010); Al-Mamum, (2009); Shiu, (2006); Firer and William, (2003)). Size of the company: natural log of total book value of asset.

Leverage: total debts divided by book value of total assets.

## HYPOTHESES

Despite various definitions of IC in the literature, there is an agreement that IC covers three main components in a company: Human Capital (HC), Structural Capital (SC) and Relational Capital (RC) (Bontis, (1998); Verguwen and Alem, (2005); Yang and Lin, (2009); Ghosh and Wu, (2007); Friz-enz. (1997); Rodger, (2003); Edvinsson, (1997); Amir and Lev, (1996) and Calisir et al, (2011)).

Human Capital (HC) is delineated as the skill, ability, knowledge and experience that the employees takes with them when they leave the company (Roos and Roos, 1997). Some of this skill is unique to the individual, while some may be generic (Ting and Lean 2009). Examples are creativity, experience, teamwork capability, innovation capability, learning capability, formal training and education, vocational qualification, flexibility and know-how. From the literature, it is confirmed that successful companies always invest in HC to develop their overall working capabilities and environment (Makki et al, 2009). Investment in employee capabilities has direct impact on financial performance (Becker et al, 2001). While Youndt (1998) submits that influence of HC on company performance is uncertain. Therefore, it is important to check empirically whether HC has direct relationship on return on asset (ROA).

Structural Capital (SC) is defined as the knowledge that stays within the company (Bontis 1998). It includes organizational processes, routines, procedures, systems, norms, cultures and databases. For example, the use of information technology device and organizational learning capability, management philosophy, corporation culture, management processes, networking system, patent, trade mark and copy right. Strong structural capital possesses supportive environment to its employee thus increasing productivity and profit and decreasing total cost of product (Bozbura, 2004). Thus, it is empirically wise to test SC value creation influence on return on asset (ROA).

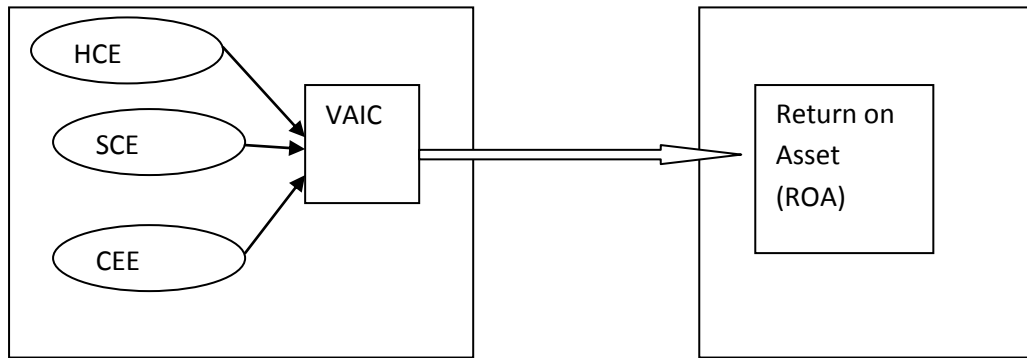
VAIC used in this study is an aggregate measure of corporate intellectual efficiency. It includes capital employed as part of IC efficiency.

The following are the hypotheses to be tested in this study.

H1: Intellectual capital components are significantly correlated with return on asset (ROA).

H2: There is relationship between IC components (HCE and SCE) and return on asset (ROA).

H3: There is relationship between capital employed (CEE) and return on asset (ROA).



**Fig 1:** Impact of IC on Return on Asset (ROA)

## RESULTS AND DISCUSSION OF THE FINDINGS

### Descriptive Statistics

For better understanding of the data, basic descriptive statistics has been applied. The study makes use of arithmetic mean as a measure of central tendency rather than median since there are less extreme observations in the data. Standard deviation was used as the primary measure of variation. Each data was value and given in the original units, i.e Nigeria's Naira (₦).

Table 1 shows minimum, maximum, mean and standard deviation of dependent and independent variables for year 2010. In 2010, average HC performance index of a company remained 2.92 with average return on assets remained at 2.65 billion respectively. On average the sample manufacturing companies created value ₦2.92 for every on naira spent on human capital. Maximum HC efficiency is ₦15.23.

### Determining Relationship among Variables

Correlation coefficient provides measure of the strength of the linear relationship between independent and dependent variables. Pearson product-moment correlation for the 3 years results ( $r = 0.706, 0.551$  and  $0.432$ ). Table 2, shows that companies with high HC efficiency are more likely to be high in ROA. Correlation for the year 2010 can be seen fully in appendix 1.

Significant relationship between HC with ROA, SC with ROA and CE and ROA confirms that knowledge, skill, experience, creative ability of human resources have strong impact not only on financial performance but also on physical capital efficiency. It can also be inferred from correlation matrices 2008-2010 that HC is playing most vital role towards financial performance of companies.

Structural capital efficiency has positive correlation with ROA (0.686, 0.635, and 0.591). Possible explanation of this yearly increase positive correlation is that SC efficiency increases when companies expand their business and there is enough human capital competence to exploit the expansion. SC efficiency has been increased with increase in ROA because SC has been fully utilized by HC.

Correlation results indicate that the higher the HC efficiency, the greater the SC efficiency will be ( $r = 0.698, 0.564$  and  $0.337$ ) and ultimately financial performance also. That is the reason most companies try to convert HC to SC to manage maximum financial performance and to cover the risk of high calibre employees turn over. Positive relationship between HC efficiency and SC efficiency is in line with the results found by Salman et al, (2012); Maditinos et al, (2011); Chen et al, (2005). The lower the relationship of SC efficiency and CE efficiency, the weaker the contribution of HC efficiency towards financial performance would be. Summarily, it can be concluded that to acquire the synergistic value from all the three measures of VAIC; it would be highly beneficial to have significant correlation among all its components.

### REGRESSION ASSUMPTION

According to Coakes and Ong (2011); Pallant (2003), to draw a conclusion based on regression analysis, certain assumptions must be tested. These assumptions were checked before running the regression models. Linearity assumption was verified through histogram diagrams between independent and dependent variables. In addition normal probability plots of the residuals also confirm that there is no serious violation of normality assumption. Likewise box plot was used to test for outliers in the data.

Variance Inflation Factor was used to check multicollinearity problem. Tabachnick and Fidell (2007) and O'Brien (2007) suggest that 0.90 or greater bivariate correlation between independent variables indicates multicollinearity. Table 2-4 depict VIF less than 9.00 in all cases indicating that none of the independent variable is substantially explained by the other independent variables. There is no problem of high correlation among independent variables, as the correlation value between variables range between -0.197 to 0.706 among variables over the three years period.

Levene's Test was used to test for heteroscedasticity among the independent variables. The test result was greater than the 0.05 and t- value less than critical value in almost all the cases suggests that variances at each level of independent variables are heteroscedasticity; thus indicating no evidence of homoscedasticity problem among the variables. Therefore, the results of regression in this study can be relied on.

### REGRESSION ANALYSIS

In order to investigate the impact of IC on ROA, regression model was developed to test the linear relationship between independent and dependent variables. The regression line gives an estimation of the linear relationship between a dependent variable and one or more independent variables. The multiple regression equation for this study was developed as:

$$Y_{ROA} = \beta_0 + \beta_1 (HCE) + \beta_2 (SCE) + \beta_3 (CEE) + \beta_4 (SIZE) + \beta_5 (LEV) + \varepsilon_i$$

Using SPSS version 16, the results of the regression for the three years (2008 – 2010) were discussed (see appendix for the tables).

Table 2, 3 and 4 reveal the results of the three regression models (2008-2010) which test the relationship between the variables. Table 2 presents the linear multiple regression findings of productivity (ROA) with independent and control variables for 2008. This table shows that adj. R square = 0.365 and Sig. = (0.000, 001 and 005 are less than  $p < 0.05$ ). The results show that all the independent variables (HCE and CEE) are positively and significantly related to company's financial performance as measured by 'ROA', except (SCE) which has negative relationship with ROA. LEV is significant at less than 0.078,  $p < 0.10$ ). On the other hand, SIZE was not significant related with ROA. This is because Sig (HCE) = 0.000 < 0.05,  $\beta$  (HCE) = 0.268, Sig (SCE) = 0.001 < 0.01,  $\beta$  (SCE) = -0.242, Sig (CEE) = 0.005 < 0.05,  $\beta$  (CEE) = 0.224 and Sig (LEV) = 0.078 < 0.10,  $\beta$  (LEV) = 138. However, size is not significantly related with ROA.

From table 3, Sig. (HCE) = 0.003 < 0.05,  $\beta$  (HCE) = 0.294, Sig. (LEV) = 0.062 < 0.10,  $\beta$  (LEV) = 0.128, were significantly and positively related with productivity (ROA) in 2009. Sig. (SCE) = 0.001 < 0.05,  $\beta$  (SCE) = -0.363, and Sig. (CEE) = 0.005 < 0.05,  $\beta$  (CEE) = 0.-224 were significant and negatively related with ROA in 2009.

From table 4, Sig. (HCE) = 0.000 < 0.01,  $\beta$  (HCE) = 0.528, Sig. (SCE) = 0.04 < 0.05,  $\beta$  (SCE) = 0.376, Sig. (LEV) = 0.08 < 0.10,  $\beta$  (LEV) = 0.148, were significantly and positively related with productivity (ROA) in 2010; while Sig. (CEE) = 0.005 < 0.05,  $\beta$  (CEE) = 0.-146 were significant and negatively related with ROA in 2010.

More importantly, the explanatory power for all three years (2008-2010)  $R^2$  in regression equations ranged between 39% and 66%, which is satisfactory in social science study. These results are much better than the results of the study conducted by Firer and Williams (2003) who found  $R^2$  up to 30% in identifying relationship between IC and corporate performance in which only CEE was significantly related to corporate performance. From the findings, we may conclude that all the three efficiencies of VAIC (HCE, SCE and CEE) have significant impact on ROA, and consistent with previous finding such as Salman et al. (2012); Maditinos et al. (2011); Fethi et al. (2011); Ahangar (2011); Chen et al. (2004, 2005) and Shiu (2006).

The implications of these findings are: (1) the higher amounts spend on human capital or resource the greater is the influence it has on ROA. (2): the higher the SC efficiency, the greater is the contribution of HC towards ROA; (3), when SCE and CEE have negative relationship with ROA means that, as the two variables (SCE and CEE) of a company increases the ROA declines. Emerging economies like Nigeria usually face the problem of inadequate organizational structural efficiency and financial/physical capital. As a result of this, the qualified, experienced and skilled human resource have less organizational structure and financial asset to fully utilize their potentials and thus reduces SC efficiency and CE efficiency toward value creation.

## CONCLUSION

The aim and research issue of this study was to investigate the impact of intellectual capital efficiency on return on asset through empirical research. The  $\beta$  values confirm that there is correlation between IC efficiency and return on asset. The findings further reveal that HC efficiency, SC efficiency, CE efficiency and leverage have significant impact on ROA. More investment on IC components can enhance the IC efficiency to get maximum value creation towards the overall performance of a company. The research finally concludes that:

1. There is a significant positive relationship between company's human capital efficiency and return on asset.
2. There is a significant positive relationship between company's leverage and return on asset.

But the results related to structural capital efficiency and capital employed efficiency and return on asset remained mixed and inconclusive. The reason for this could be due to the fact that many manufacturing companies' managers like other developing countries invest heavily in human capital without providing adequate and proportionate organizational structure and physical capital to work with. As a result, structural capital and capital employed deteriorates and leads to reduction in overall performance of IC efficiency as well as return on asset.

## CONTRIBUTION OF THE STUDY

This study shows trend analysis of the association between IC and ROA in Nigeria manufacturing companies. This would be a good reference point to conclude the role of IC towards financial performance globally. Companies' managers are likely to benefit by understanding the importance of allocating its valuable resources to support IC and ultimately companies' financial performance; as investment in IC brings higher financial return than the same investment in physical asset. With the level of understanding the role of IC, managers would be in a better position to control their resources through controlling and managing of their companies' IC efficiency.

## POLICY IMPLICATIONS

There is empirical evidence that IC components influence companies' performance from this study. Specifically, the finding shows that human capital efficiency influence performance of Nigerian manufacturing companies. In order to achieve higher profitability and sustainability, these companies should implement policies that will improve and upgrade their employees' skill and competence in the area of training and development. This study further reveals the potentials of structural capital in adding value to the company. This is a signal to Nigerian companies that investments in structural capital drivers are worthwhile. Therefore, it is important for Nigerian manufacturing companies to put more emphasis on policy that will promote and improve the process, structure, culture and norms of their companies. In addition, Nigerian government should borrow a leaf from Malaysia government by enacting HRDF (human resource development fund) Act and a body to be in-charge of collecting shares levy from the employers for the purpose of promoting training of employees in workplace, and administrative of the HRDF like Pembangunan Sumber Manusia Berhad (PSMB) in Malaysia since 1993. This will in return help the Nigerian economy to grow as the employees in the sectors will be skilled in line with the needs of their businesses and industrialization strategy of the country.

## LIMITATIONS OF THE STUDY

This study is based on 20 Nigerian manufacturing companies listed on the Nigerian Stock Exchange. The data used in this study were only based on the voluntary disclosure item of IC in the annual report of the sampled companies which might be different from IC disclosure and listing requirement of other countries around the world. These differences can also affect the results of VAIC model in other regions, as Pulic's VAIC model used in this study takes data from public listed annual reports on specific country's accounting framework. Since, the data used in this study related to listed manufacturing companies in Nigeria, thus, limiting the generalization of the finding to only Nigerian manufacturing companies.

## FUTURE RESEARCH AREA

As the components of IC and the IC models have not yet been finalized, more studies on comprehensive and widely agreed VAIC are needed. Future research may explore not only parameters of IC but try to incorporate different item of measure and develop some exhaustive IC model usable for external stakeholders as well as internal management to evaluate the IC performance of a company, which could also be acceptable to International Accounting Standard Board (IASB) for financial reporting.

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Table 1: Descriptive Statistics (2010)

<u>Variable</u>	<u>N</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Mean</u>	<u>Std.Deviation</u>
HCE	20	.2084	15.2391	2.917053	2.5501677
SCE	20	.0862	3.3125	.884706	.5649925
CEE	20	.0246	6.7487	1.069568	1.0409023
SIZE	20	4.0000	6.8912	5.395742	.7550883
LEV	20	.0509	7.5931	1.240064	1.1210327
ROA	20	.2058	8.3206	2.499524	1.5766969
Valid N (listwise)	20				

Table 2 Correlation for 2010

	CEE	HCE	SCE	SIZE	LEV	ROA
<b>Pearson Correlation</b>	1					
<b>Sig. (2-tailed)</b>						
<b>Pearson Correlation</b>	.377**	1				
<b>Sig. (2-tailed)</b>	.000					
<b>Pearson Correlation</b>	.340**	.698**	1			
<b>Sig. (2-tailed)</b>	.000	.000				
<b>Pearson Correlation</b>	.031	-.006	.197*	1		
<b>Sig. (2-tailed)</b>	.742	.948	.033			
<b>Pearson Correlation</b>	-.117	-.035	-.183*	-.132	1	
<b>Sig. (2-tailed)</b>	.209	.710	.048	.156		
<b>Pearson Correlation</b>	.289*	.706**	.406**	-.040	.068	1
<b>Sig. (2-tailed)</b>	.022	.000	.000	.671	.463	

\*\* . Correlation is significant at the 0.01 level (2-tailed)

Table 3: Multiple regression results for year 2008 (ROA)

Variables	Beta	VIF
Constant	2.670	
HCE	0.263	1.148
SCE	0.342	1.022
CEE	0.224	1.178
SIZE	-0.089	1.064
LEV	0.138	1.342

Adj.R =0.365

Table 4: Multiple regression results for year 2009 (ROA)

Variables	Beta	VIF
Constant	3.135	
HCE	0.297	1.283
SCE	-0.363	1.216
CEE	-0.240	1.632
SIZE	-0.014	1.768
LEV	0.128	1.373

Adj. R = 0.557

Table 5: Multiple regression results for year 2010 (ROA)

Variables	Beta	VIF
Constant	2.367	
HCE	0.528	1.275
SCE	0.376	1.202
CEE	0.258	1.693
SIZE	-0.025	1.078
LEV	0.146	1.286

Adj. R = 0.668

Several concepts like intellectual capital, intellectual assets, knowledge assets, and intangible assets can be used interchangeably (Bontis et al., 2000; Kujansivu & L nnqvist, 2007; Lev, 2001; Roos et al., 1997). Peppard & Rylander (2001) argued that the combination of intellectual assets plays a key role in creating value for the company.  intellectual capital on market, productivity and financial performance of the real estate companies listed on Borsa Istanbul before and after the financial crisis. This study is conducted on the real estate companies listed on Borsa Istanbul, with a total of 27 companies.  Return on Assets. ROA.  $\text{Net Income/Total Assets}$ . Return on Equity. ROE.  $\text{Net Income/Total Equity}$ .